

CURRENT LITERATURE.

Flora of the Hawaiian Islands.¹

Insular floras are always peculiarly interesting, and few are more so than that of the Hawaiian Islands. Lying so far removed from all continents, these islands present important problems to the geographical botanist. During a residence of twenty years Dr. Hillebrand unremittingly studied the Hawaiian flora, thoroughly exploring the whole region and cultivating very many of its native plants. This book, embodying as it does the results of such protracted study, is more than a mere manual, for it contains most valuable notes upon the peculiarities of the flora and offers many suggestions as to its origin. It is a pity that the author was not spared to correct the proof-sheets and to develop his notes, which are given as mere memoranda, but the editing has evidently been very conscientiously done by his son, assisted by Professor Askenasy, of Heidelberg. An introduction of twenty pages gives a general account of the position and nature of the Hawaiian Islands, as well as the striking features of its flora. Then follows Mr. Bentham's "Outlines of Botany," from his British and Colonial Floras, with a good glossary. The diversity of conditions, and hence of the flora, of the different islands is so great that in our limited space we can give no account of it, although it is presented in a very clear and interesting way. Five different zones of elevation are described, called the "lowland zone," mostly grass-covered after rains, with isolated clumps of trees; the "lower forest zone," with rather open woods, characterized by the pale green foliage of *Aleurites Moluccana*; the "middle forest zone," within the region of the clouds, and luxuriant in trees and jungle, and with a great exhibition of *Lobeliaceæ*, "the peculiar pride of the flora;" the "upper forest zone," characterized by stunted trees; the "bog-flora" of the high table-land of certain islands. A comparison with other floras brings out the striking difference in the great number of varieties in all the species of the principal genera, as though nature had run wild in the production of diverse forms. These islands seem to be the only ones of the Polynesian group which contain a large proportion of indigenous plants with American affinities, while Australian types are wanting or very scantily represented. Southern Asiatic types are few, and many of them have probably been carried over by the aborigines. The entire absence of gymnosperms is one of the notable features of the flora, as well as the low size of all the trees, none but the cocoa-nut palm exceeding 100 feet, the usual height of the largest trees being 50 or 60 feet. Nearly all the native plants are perennial and

¹ HILLEBRAND, DR. WILLIAM.—Flora of the Hawaiian Islands: a description of their phanerogams and vascular cryptogams. Annotated and published after the author's death by W. F. Hillebrand. xevi and 673 pp., with 8 maps, 8vo. Heidelberg: Carl Winter, University Bookseller, 1888. [Williams & Norgate, London. B. Westermann & Co., New York.]

woody. This volume describes 844 species of phanerogams, representing 335 genera, and 155 pteridophytes with 30 genera, making a total of 999 species. It is believed that 115 of these species have been introduced since the discovery by Captain Cook in 1779, and 24 species by the natives in pre-historic times. This leaves 860 species as original inhabitants, of which no less than 653 are endemic, or over 75 per cent. Of this 653 endemic species 250 belong to endemic genera. Considering dicotyledons alone, over 85 per cent. of their species are endemic. This character is strikingly shown in Lobeliaceæ, of which 58 species are known, all endemic, belonging to 6 genera, 5 of which are endemic. It is needless to say that the volume abounds in new species, and illustrates in every page the fact that it deals with a long isolated flora.

The geological history of plants.²

It had been known for some time that a work was being prepared by Sir William Dawson on the geological history and development of vegetation, and its appearance was anxiously looked forward to, in hope that we should at last have an American work, illustrated by American material, and clearly abreast of the times. The work is before us, and, after a thorough examination, we can not repress a general feeling of disappointment that it is not what was expected from one seemingly so well qualified, although in some particulars it is very satisfactory, and must be of permanent value. The opening chapter deals with the evidences of the existence of plant life in the so-called azoic formation, and the facts adduced are of the most convincing nature. The presence of the immense beds of iron ore, which, so far as now known, can only be deposited in the presence of decaying organic matter, is a strong presumptive argument, as is also the presence of beds of graphite, which, according to Sir W. E. Logan, aggregate in the Laurentian a thickness of more than thirty-five hundred feet. The oldest unquestionable plant remains admitted by Dawson, from the Skiddaw rocks of Cumberland, are called by him Protannularia, since he regards it as being allied to the carboniferous genus Annularia. These are regarded not as algæ, but as Rhizocarps, and with the Protostigma of Lesquereux indicate the presence of the Rhizocarpeæ and Lycopodiaceæ in the Silurio-Cambrian. The supposed taxine wood first called Prototaxites by Sir William he now regards as probably the stem of a gigantic sea-weed, as was long ago pointed out by Carruthers. The problematical organisms, which have until lately been regarded as plants, Dawson concludes, with some of the European scientists, must probably represent the tracks or burrows of worms. Under this head he places the so-called genera Bilobites, Rusichnites, Paleophycus, Buthrotrephis, etc. In the Devonian, and particularly in the upper portion to which the name Erian has been given,

²DAWSON, SIR J. WILLIAM.—The Geological History of Plants. Vol. LXI, Internat. Sci. Series. 12°. New York: D. Appleton & Co. 1888.

the vegetation became more pronounced, and we find ferns, Equisetaceæ, Sigillariæ, Lepidodendreæ, etc., in comparative abundance. We can not, however, agree with the author that the Taxineæ or yews extend into the Devonian, or, indeed, into the Carboniferous. The species described as *Dadoxylon* undoubtedly represents the wood of *Cordaite*s, as is shown by the fact that they all possess an *Artisia* pith, slit-form bordered pores covering the entire radial walls of the tracheïds. *Cordaite*s is a typical paleozoic genus which is allied to the cycads on one hand and the conifers on the other, and the characters as established by Grand'Eury and Renault, who have so successfully worked up the European material, agree with all of Dawson's species *Dadoxylon*. The *Araucarites gracilis*, thought to represent the leaves of a species of *Dadoxylon*, is probably a species of *Walchia*, a Permian genus.

Another debatable point is the relationship of the Sigillariæ. Since the admirable researches of Williamson on the internal structure, and the discovery by Zeiller of cones containing both microspores and macrospores, their position among the cryptogams, although possessing an exogenous mode of growth, seems to be clearly defined, and the prediction that it will ultimately be proved that there are two branches of the family, one coniferous and the other cryptogamous, is not likely to be fulfilled.

In speaking of the transition from cryptogams to phænogams Sir William thinks it probable that these have been their lines of connection, "one leading from the Lycopods by the Sigillariæ, another leading by the *Cordaite*s, and the third leading from the Equisetums by the *Calamites*." After making this unequivocal admission he makes haste to say: "I do not make these remarks in a Darwinian sense, but merely to state what appear to be the lines of natural affinity, and the links wanting to give unity to the system of nature." It seems almost incredible in this state of scientific thought that a denial of the doctrine of evolution, especially in a work on the development of vegetation, should be deemed expedient.

The remaining chapters of the work are devoted to Mesozoic and Tertiary vegetation, and as the deposits containing these happen not to be very well developed within the British provinces, the account becomes in consequence meager and incomplete; in fact, the omissions of the whole work "correspond," as has been said by another reviewer, "with the imperfections of the geologic record in the locality studied by the author."

The illustrations, about eighty in number, are, almost without exception, from earlier published works on Canadian plants by the author.

The Flora of Miquelon.

The double island off the south shore of Newfoundland known as Miquelon has been pretty thoroughly explored by Dr. Delamare, and the

results of his collecting and notes appear in collected form in this admirable "Flora Miquelonensis."³ Dr. Delamare has been assisted in the preparation of this little work by a number of specialists, some of whose names appear as joint authors. The flora contains a description of the topography, climate and superficial geology of the isle, extended remarks on the relative distribution of the phanerogams, with interesting notes on various matters. The introduced and cultivated species are indicated, and also species found by de la Pylaie. Of the cryptogams, the ninety-four species of mosses are treated at greatest length, and the list contains descriptions of several new varieties and one new species, *Dicranum Miquelonense* Ren. et Card., and a new sub-species of *Rhacomitrium canescens*, viz.: *R. Delamarei* R. & C. Only four species are extra-European. Five species new to North America are included in the list. Among Sphagnaceæ, out of the twenty species and sub-species common to Europe and North America, only four have not been found in Miquelon, which shows how unusually rich the island is in the peat mosses. Thirty-seven species of Hepaticæ, 126 of Lichens and forty-three of marine Algæ are also listed. In general, the character of the phanerogamic flora is strongly American (46 per cent.) and boreal, whereas the cryptogamic flora greatly resembles that of the mountains and northern parts of Europe. The island of Saint Pierre, a league away, which was long ago explored by de la Pylaie, receives but scant notice in this paper, which is an admirable contribution to geographical botany.

Our Native Ferns.⁴

It is quite fortunate that so soon after the destruction of the remainder of the second edition of this handy manual we are able to notice the third edition. The fact that the first edition was published no longer ago than 1881 is evidence enough of the value of this little book and that it has a place to fill. In the first edition 140 species of true ferns were described. This number is now augmented by nineteen, and three of the former species reduced to varieties. The fern allies receive the accession of one genus, *Salvinia*, and eight species, while three former species have been reduced in rank. The first ten chapters, that is about half of the book, deal with the life-history, structure and relationships of the pteridophytes. The latter half is occupied with condensed and accurate descriptions of the species, accompanied by well-made analytic keys which lead the user to within one or two species of the determina-

³ DELAMARE, E., RENAULD, F., CARDOT, J.—Flora Miquelonensis: Florule de l'île Miquelon (Amérique du Nord), énumération systématique avec notes descriptives des Phanérogames, Cryptogames vasculaires, Mousses, Sphaignes, Hépatiques et Lichen. pp. 79, 8vo. Lyon: Association Typographique, 1888.

⁴ UNDERWOOD, LUCIEN M.—Our native ferns and their allies, with synoptical descriptions of the American Pteridophyta north of Mexico. Third edition, revised. pp. xii, 156, figs. 35. 12mo. New York: Henry Holt & Co., 1888.

tion. This feature, for the purposes of such a book, is especially to be commended. Of much value also are the abundant references to the American sources of information about our native pteridophytes. The whole text is exceedingly satisfactory, and will do very much to stimulate the user to a closer acquaintance with our ferns and to make of him an acute observer, or even an original investigator. The typography is worthy of the text. It would have been a happy thing, however, for the new publisher to have improved the quality of a few of the illustrations.

Minor Notices.

MR. WOODWORTH, working in Dr. Farlow's laboratory, has investigated the growing point of *Fucus*,⁵ using *F. furcatus* first, and confirming his results upon *F. vesiculosus* and *F. filiformis*. While Reinke and Rostafinski found what they considered a group of cells, Woodworth sees a single initial cell, four-sided, wedge-shaped, with convex sides, the smaller upper end being rounded and the base truncated, with its greater diameter at right angles to the broad surface of the frond. Woodworth was able to observe the relations of the cells accurately by imbedding the tips of the fronds in paraffin and cutting ribbon serial sections, and his results are confirmed by their agreement with what is known of related species and cryptogams in general.

WE HAVE HAD many guesses, and some shrewd ones, as to whether our *Sarracenias* profit by their insect-catching arrangements. Dr. W. P. Wilson has undertaken to investigate these plants thoroughly. A preliminary report⁶ of some work deals with the morphology of the leaves of our common northern and southern species. Both species form small early leaves unlike the mature ones. Those of *S. purpurea* are miniatures of the mature leaves of *S. variolaris*, and *vice versa*. This fact and the rudimentary character of its honey glands lead to the conclusion that *S. purpurea* is a retrograde development from *S. variolaris*. This conclusion is confirmed by the fact that *S. variolaris* secretes a considerable amount of a digestive ferment which dissolves the soft parts of insects, while *S. purpurea* produces but a trace of it.

OF LOCAL FLORAS, Milwaukee county, Wisconsin, has had more than a fair share. Mr. Lapham's assiduous collecting was supplemented by his permanent record in various lists of the flora of Milwaukee and vicinity. The last list by Mr. Wheeler,⁷ curator of the Milwaukee public museum, includes 691 Phanerogams and vascular Cryptogams, of which 567

⁵WOODWORTH, W. McMICHAEL.—The apical cell of *Fucus*. (Contrib. from Crypt. Lab. Harvard Univ. ix). pp. 9, pl. 1. 8vo. Reprinted from *Annals of Botany*, Feb., 1888.

⁶WILSON, W. P.—On the relation of *Sarracenia purpurea* to *variolaris*. p. 1. 8°. Proc. Acad. Nat. Sci. Phila., Feb. 20, 1888.

⁷WHEELER, W. M.—Flora of Milwaukee County. pp. 154-190. 8vo.—Extract from Proc. Nat. Hist. Soc. of Wisconsin, April, 1888.

are indigenous to the state. 124 species are, therefore, introduced, of which 113 come from Europe, and probably many of them directly from Germany. The list is prefaced by some remarks on the topography and climate of the county. It does not seem to be founded upon preserved specimens, which is unfortunate.

A PRELIMINARY catalogue^s of the vascular plants growing within a hundred miles of New York City has been issued by the Torrey Botanical Club. The boundary line is quite an arbitrary one, but probably limits the work as well as if it was more natural. A list of ballast plants is also included, and presents a formidable array of foreigners who have landed upon our shores, the great majority of whom, it is to be hoped, will find no welcome. The noticeable thing about the catalogue is its innovations in respect to specific names, for which, we are told, the sub-committee on nomenclature, consisting of Messrs. Britton, Sterns and Poggenburg, "alone are responsible."

NOTES AND NEWS.

DR. CHARLES E. BESSEY, of the University of Nebraska, sails for Europe June 16 to spend the summer.

THE FIRST PART of the seventh volume of Saccardo's *Sylloge Fungorum* is issued, and will hereafter receive suitable notice.

MR. M. S. BEBB describes (with plate) *Salix balsamifera* in *Bull. Torr. Bot. Club* (May), and gives an account of its discovery in the White Mountains.

ARCHÆOPHYTON NEWBERRYANUM is the name of a supposed Archæan plant described (with plate) by Dr. N. L. Britton in *Annals N. Y. Acad.* iv., 123.

RECENTLY FIGURED North American plants in *Garden and Forest* are *Rosa minutifolia* Eng. (April 25), *Hymenocallis humilis* Watson (May 2), *H. Palmeri* Watson (May 16).

DR. H. H. RUSBY, of Columbia College, has distributed a reprint of his interesting paper, "Coca at home and abroad," published in the *Therapeutic Gazette* for March and May.

MR. GEORGE MASSEE has published a revision of the genus *Bovista* in *Journal of Botany* (May). The genus is credited with thirty-nine species, four of which are described as new.

THE REVISION of Scotch Sphærospideæ and Melanconieæ by Prof. J. W. H. Trail is brought to a close with 223 species in the *Scottish Naturalist* for April. It is a list of species and habitats with a key to the genera, but without descriptions of the species.

^sPreliminary Catalogue of Anthophyta and Pteridophyta reported as growing spontaneously within a hundred miles of New York City. Compiled by a committee of the Torrey Botanical Club. xviii and 90 pp., with map. New York, 1888. Price, \$1.